PATENT

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TITLE OF THE INVENTION

IMPROVED PLUMBING FIXTURES FOR COMMERCIAL SINK WITH PRE-RINSE UNIT AND PACKAGING THEREFOR AND METHOD OF PACKAGING

CROSS-REFERENCE TO RELATED APPLICATIONS

N/A

STATEMENT REGARDING FEDERALLY SPONSORED RESEARCH OR DEVELOPMENT

N/A

BACKGROUND OF THE INVENTION

As shown in a packing case 10 in Fig. 1, plumbing fixtures for commercial sinks include faucets 11 with a pre-rinse unit. Included as components of the pre-rinse unit are a vertically disposed riser 12 having one end connected to the faucet 11, a flexible stainless steel hose 13 having one end connected to the opposite end of the riser, and a spray nozzle 14 at the opposite end of the flexible steel hose 13. A finger hook 15 is connected to the riser to retain the spray nozzle next to the riser when the spray nozzle is not in use.

As shown schematically in Fig. 2, the hot water line 16 and the cold water line 17 must be attached to the faucet 11 from beneath the sink. The depth of the sink's basin can be on the order of two feet, and the space between the kitchen wall and the wall of the basin closest to the kitchen wall can vary depending on the installation. But this space typically is relatively cramped and less than one foot wide. The attachment of the hot water line 16 and the cold water line 17 to the faucet 11 is made via a fixture fitting such as a spreader body 20 that has one end connected to each of the hot water line

and the cold water line. The opposite end of the spreader body 20 is threaded to engage one end of a turnbuckle 21. The spreader body 20 must fit in the space between the basin of the sink and the kitchen wall that is closest to the basin.

The faucet 11 has a tap 22 that extends axially beneath the sink's flange 18 (See Fig. 5) on which the faucet is mounted. The tap 22 is provided with four symmetrically spaced axially extending holes. Two opposite holes 23 are blind, and so do not lead to water passages. Each of the other two holes 24, 25 leads to one of the faucet's valves 26, 27 for controlling the flow of hot water or cold water. The exterior axial cylindrical surface of the tap 22 is threaded to receive one end of the turnbuckle 21.

The opposite end of the turnbuckle 21 is connected to a threaded axially extending portion of the spreader body 20. The end of the threaded axially extending portion of the spreader body 20 has two openings 28, 29 and two posts 30. Each post 30 is configured to be received within one of the blind holes 23 in the end of the tap 22. Each opening 28, 29 of the spreader body 20 is configured to line up with one of the two remaining holes 24, 25 respectively, in the tap so that a passage will be formed for the flow of water. The installer rotates the spreader body 20 until the posts 30 align with the proper blind holes 23 in the tap so that the opening 28 in the fixture fitting 20 that is connected to the hot water line 16 will align with the hole 24 in the tap 22 that leads to the valve 26 controlling the flow of hot water from the faucet 11 and the opening 29 in the fixture fitting 20 that is connected to the cold water line 17 will align with the hole 25 in the tap 22 that leads to the valve 27 controlling the flow of cold water from the faucet. Tightening of the turnbuckle 21 pulls the end of the tap 22 into contact with the end of the spreader body 20 and places hole 24 opposite opening 28 and hole 25 opposite

opening 29. Because of the limited space available for the installer to work when attaching the spreader body 20 to the underside of the faucet 11, such installation can become both tedious and unduly time consuming for the installer.

The tap 22 is formed of cast brass. Accordingly, the dimensional tolerances concerning the shapes of the holes 23, 24, 25 are rather loose, and the holes 23, 24, 25 can be less than perfectly circular. If the installer is not careful, the installation can become less than satisfactory. For example, if the turnbuckle 21 is not properly tightened, leaks can result. If the posts 30 are not properly aligned with the blind holes 23, then sometimes the passage to the hot water valve 26 or the cold water valve 27 is blocked by one of the posts 30. Sometimes the installer mistakenly may try to force one of the posts 30 into one of the tap's holes 24 or 25 for the hot water or the cold water, resulting in damage to the hole 24 or 25. Such damage can cause leaks. For example, sometimes such damage will enable the hot water leaving the opening 28 of the spreader body 20 to bleed into the cold water hole 25 of the tap 22. Sometimes the cold water leaving the cold water opening 29 in the spreader body 20 will bleed into the hot water hole 24 of the tap 22 due to such damage or due to the less than perfect circularity or location of the holes 24, 25 in the tap 22.

A wall bracket 31 is typically included to provide support for the riser 12 by connecting the riser to the wall. The distance between the kitchen wall and the riser will vary depending upon the location of the faucet 11 relative to the kitchen wall. Accordingly, the length of any bracket 31 that extends between the kitchen wall and the riser 12 must lend itself to being cut to size for any given installation.

The exterior finish of the fixture fittings that are visible to the user when they have been installed, is highly polished. Accordingly, during shipment of these fixture fittings to the job site, care must be taken to avoid nicks and scratches to this finish. If the fittings are permitted to touch one another during shipment, such nicks and scratches will result. One method of packing and shipment that avoids nicking and scratching the finish requires the fixture fittings to be fixed to an underlying cardboard substrate 32 by the application under vacuum of a heated plastic material 33 that is shrink-wrapped around the fittings and adhered to the underlying cardboard substrate 32. However, this method has its drawbacks. The heated plastic 33 tends to adhere to the surfaces of the fittings. This requires time consuming removal of the plastic, since care must be taken to avoid nicking and scratching the surfaces of the fixture fittings during the removal process.

OBJECTS AND SUMMARY OF THE INVENTION

It is a principal object of the present invention to provide plumbing fixture fittings for commercial sinks with a pre-rinse unit wherein the fittings are configured so that either a solid spreader body or flexible connector hoses can be attached when installing the unit and connecting it to the water supply from beneath the sink.

It is also a principal object of the present invention to provide plumbing fixture fittings for commercial sinks with a pre-rinse unit wherein the connections to the hot and cold water supplies can be effected more reliably and with a reduction in the time and effort that the installer expends to complete these connections.

It is another principal object of the present invention to provide plumbing fixture fittings for commercial sinks with a pre-rinse unit wherein the unit is supplied in a package that protects the fittings from nicks and scratches while reducing the effort

required of the installer to unpack the fittings and install them with less effort and time than conventionally packed fittings.

It is an additional principal object of the present invention to provide plumbing fixture fittings for commercial sinks with a pre-rinse unit wherein many of the fittings are packaged in a pre-assembled way that still protects the fittings from nicks and scratches while reducing the effort required of the installer to unpack the fittings and install them with less effort and time than conventionally packed fittings.

It is a further principal object of the present invention to provide plumbing fixture fittings for commercial sinks with a pre-rinse unit wherein a variable length riser support is provided with a configuration that reduces the time and effort of installation.

To achieve the objects and in accordance with the purpose of the invention, as embodied and broadly described herein, the faucet can include a universal tap. The universal tap is provided with a pair of blind holes so that the tap can be used to receive the conventional spreader body that is used to connect each of the hot water lines and cold water lines to the faucet from beneath the sink or the counter in which the sink is installed. The universal tap is desirably formed of forged brass and provided with a pair of threaded holes. Each threaded hole is used to connect to the threaded male end of one of the hot water line and the cold water line that provide water service to the faucet. Each of the threaded holes of the universal tap leads to one of the hot and cold water passages of the faucet.

However, because of these threaded holes in the universal tap, the installer need not use the conventional spreader body that has openings brought into alignment with the holes in the conventional tap of the faucet provided for hot and cold water. Instead

of the conventional spreader body, the installer can use two flexible stainless steel hoses that are provided. Each such flexible stainless steel hose has a threaded male end that can be threaded into one of the threaded holes of the universal tap. An O-ring or sealing gasket can be provided at the threaded end of each of the flexible stainless steel hoses to form a water tight seal when the threaded end of the flexible stainless steel hose is screwed into the appropriate threaded hole of the universal tap. In this way, the installer can rotate the flexible stainless steel hose from beneath the sink at the remote end of the flexible steel hose. This convenience eliminates the need for the installer to work with an awkward spreader body and turnbuckle in the narrow space between the kitchen wall and the wall of the sink's basin in order to attach the water supply hoses to the conventional spreader body. This apparatus of the present invention also provides for a more reliable connection to the water service and a connection that is more easily maintained.

The pre-rinse assembly can include a unique riser support that is designed to facilitate installation of the pre-rinse assembly. The riser support includes a stand-off having opposed ends. The riser support includes a wall bracket that is selectively, detachably fixed to one end of the stand-off. This one end of the stand-off can be permanently or detachably fixed to the base of the wall bracket. The opposite end of the stand-off can be cut to any desired length by the installer to accommodate different sink installations. The riser support can include a clamp that selectively, detachably attaches the opposite end (the cut off end) of the stand-off to the riser. The clamp is formed desirably as a clam-shell arrangement that requires only a pair of threaded fasteners in order to attach the stand-off to the riser.

A faucet with pre-rinse assembly can be provided in a shipping package that facilitates quick and easy removal and installation of the packaged fittings by the installer. Such a product includes a first rigid substrate that has been rendered porous to the passage of air therethrough. The tension spring of the pre-rinse assembly rests on the substrate. A flexible steel hose is connected to a connection fitting and is disposed through the spring until the fitting is received within the spring and protrudes from one end thereof in a position that is ready for connection to the riser. A polyurethane inner sleeve lines the inside of the stainless steel flexible hose. A rigid shell is configured and disposed to cover the spring and the hose and rest against the substrate. The shell is desirably composed of clear polyvinychloride having a basis weight of about 0.105 kg/cubic meter. A sheet of flexible material is heated and shrink-wrapped over the shell and the substrate and holds the shell against the substrate. The sheet of flexible material desirably comprises a polyethylene film having a basis weight in the range of 920 kilograms per cubic meter to 950 kilograms per cubic meter. The sheet of flexible material is heated to a temperature in the range of 70 to 110 degrees Centigrade before being shrink-wrapped. Thus, the rigid shell is disposed between the underlying rigid substrate and the shrink-wrapped plastic sheet so that both the spring and the hose are protected from entanglement with the heated sheet of flexible material.

In some embodiments of the packaged fittings, a finger hook is already connected to the riser of the pre-rinse assembly that is mounted on the substrate covered with the shrink-wrapped sheet of flexible material. In some embodiments of the packaged fittings, the riser support with the stand-off and the wall bracket are pre-

assembled and resting against the substrate that is covered with the shrink-wrapped sheet of flexible material.

Additional objects and advantages of the invention will be set forth in part in the description that follows, and in part will be obvious from the description, or may be learned by practice of the invention. The objects and advantages of the invention may be realized and attained by means of the instrumentalities and combinations particularly pointed out in the appended claims.

The accompanying drawings, which are incorporated in and constitute a part of this specification, illustrate at least one presently preferred embodiment of the invention as well as some alternative embodiments. These drawings, together with the description, serve to explain the principles of the invention but by no means are intended to be exhaustive of all of the possible manifestations of the invention.

BRIEF DESCRIPTION OF THE DRAWINGS

Fig. 1 illustrates a perspective view of conventional components of a faucet with a pre-rinse unit in a conventional package therefor;

Fig. 2 illustrates from a perspective view the assembly of components of a faucet;

Fig. 3 illustrates from a perspective view the assembly of components of a faucet;

Fig. 4A illustrates from a perspective view the assembly of components of a faucet;

Fig. 4B illustrates from a perspective view (with environmental structure shown in phantom by chain-dashed lines) the assembled components of an accessory for the faucet;

Fig. 4C illustrates from an exploded perspective view the unassembled components of Fig. 4B;

Fig. 5 illustrates a side view of conventional components the assembly of components of a faucet installed in a sink;

Fig. 6 schematically illustrates the method of pre-assembly and packaging of some of the fittings of the pre-rinse assembly;

Fig. 7A is a perspective view of some of the package fittings of the pre-rinse assembly in accordance with a presently preferred embodiment of the present invention;

Fig. 7B is a perspective view of some of the package fittings of the pre-rinse assembly in accordance with a presently preferred embodiment of the present invention;

Fig. 8A schematically illustrates extraction of pre-assembled fittings of the pre-rinse assembly in accordance with a presently preferred embodiment of the present invention; and

Fig. 8B schematically illustrates extraction of pre-assembled fittings of the pre-rinse assembly in accordance with a presently preferred embodiment of the present invention.

DETAILED DESCRIPTION OF THE PREFERRED EMBODIMENTS

Reference now will be made in detail to the presently preferred embodiments of the invention, one or more examples of which are illustrated in the accompanying drawings. Each example is provided by way of explanation of the invention, which is not restricted to the specifics of the examples. In fact, it will be apparent to those skilled in the art that various modifications and variations can be made in the present invention

without departing from the scope or spirit of the invention. For instance, features illustrated or described as part of one embodiment, can be used on another embodiment to yield a still further embodiment. Thus, it is intended that the present invention cover such modifications and variations as come within the scope of the appended claims and their equivalents. The same numerals are assigned to the same components throughout the drawings and description.

A presently preferred embodiment of the installation fittings of a faucet assembly is shown in Fig. 3 and is represented generally by the numeral 40. The faucet is generally designated by the numeral 41 and includes a universal tap 42 that extends axially and desirably is formed of forged brass. Internally of the tap 42, there is provided a first water passage 44 and a second water passage 45. Each of the first and second water passages (44, 45) extends axially into the tap 42, as is schematically indicated in Fig. 3 by the two sets of parallel dashed lines designated 43. Each of the first water passage 44 and second water passage 45 is connected in communication with one of the internal passages (not shown) through which the water from the hot water supply line 16 and the cold water supply line 17 are provided to the valves 26, 27 inside the faucet 41 that regulate the flow of hot and cold water, respectively, through the faucet 41 and into the riser. These valves 26, 27 are controlled by the handles 46, 47 that are mounted on the cross member of the faucet 41. As shown in Fig. 3, the hot water supply line 16 is connected to the first water passage 44, and the cold water supply line 17 is connected to the second water passage 45. As shown in Fig. 3, each of the first and second water passages 44, 45 in the tap 42 is provided internally with helical threads, which can be precisely machined in the forged brass.

In accordance with one aspect of the present invention, a pair of flexible steel conduits is provided. As shown in Fig. 3, each conduit 48, 49 can be used for bridging the connection from the universal tap 42 to one of the hot water supply line 16 and the cold water supply line 17. Each of the flexible steel conduits 48, 49 has a first end 50, 51 that is configured to be threaded into at least one of the threaded holes 44, 45 of the universal tap 42. The opposite end of each of the flexible steel conduits 48, 49 is configured with a connector 52, 53 so as to be able to be connected to one of the hot and cold water supply lines 16, 17 that brings hot and cold water to the faucet 41. At the threaded end 50, 51 of each of the flexible steel conduits 48, 49, there is provided a flexible gasket 54 in the form of an O-ring that is used to seal the connection that is formed between the threaded end 50, 51 of the flexible steel conduit 48, 49 and the threaded hole 44, 45 of the universal tap 42 of the faucet 41.

As shown in Fig. 3 for example, symmetrically spaced with respect to the two threaded holes 44, 45 that extend axially into the tap 42, are a pair of unthreaded blind openings 23 extending axially into the tap 42. The pair of blind holes 23 is disposed alternately with the first hole 44 and the second hole 45. Each of these blind holes 23 is configured to receive one of the posts 30 that extends axially from the conventional spreader body 20 that is used in conventional connections from the tap to the water supply lines. The provision of the two blind holes 23 will enable an installer to use the universal tap 42 in a conventional manner, if desired. Thus, the universal tap 42 of the faucet of the present invention lends itself to use with the conventional manner of attachment, if the user so desires. Accordingly, the exterior cylindrical axial surface 55 of the universal tap 42 also is threaded to receive the turnbuckle 21 that is used in the

conventional connection fixture. In this way, the turnbuckle 21 can be screwed onto the end of the universal tap 42 in order to link the faucet 41 with a conventional spreader body 20.

Another fitting of the present invention can include a variable length, riser support. The riser support is provided with a configuration that reduces the time and effort needed for installation of same. As shown in Fig. 4B for example, a riser support is indicated generally by the numeral 60. As shown in Figs. 4A, 4B and 4C, the riser support 60 includes a stand-off 61 (a.k.a. bridging member) that is a rigid elongated rod that has opposed ends. The stand-off 61 typically is formed of a brass tube but can be formed of other rigid materials such as stainless steel, polycarbonates or other synthetic materials or composites. One end 62 of the stand-off 61 is fixed, either permanently or detachably, to a wall bracket 63. The wall bracket 63 includes a rigid plate that extends in a plane that is perpendicular to the axis of the stand-off 61. The wall bracket 63 also can be provided with a plurality of holes 64 that are configured to receive fasteners such as threaded screws 65 (Fig. 4A). As shown in Fig. 4A, the fasteners 65 attach the wall bracket 63 to the wall 66 behind the sink 67.

As shown in Fig. 4B, the riser support 60 includes a riser clamp 70. As shown in Fig. 4C, the riser clamp 70 has opposed ends 71, 72. One end 71 of the riser clamp is configured to be connected to the free end 68 of the stand-off 61. The free end 68 of the stand-off 61 is the end that would be cut to accommodate different distances between the kitchen wall 66 and the riser 12. As shown in Figs. 4A and 4B, the opposite end 72 of the riser clamp 70 is configured to be connected to the riser 12 (shown partially in phantom).

As shown in Fig. 4B, one end 72 of the riser clamp 70 defines a riser opening 73 that is configured to receive and grip the riser 12. The opposed end 71 of the riser clamp 70 similarly defines a stand-off opening 74 that is configured to receive and grip the free end 68 of the stand-off 61. As shown in Fig. 4C, the riser clamp 70 includes a first mating member 75 and a second mating member 76. As shown in Fig. 4C, a male-female interfit connection at this one end 72 of the riser clamp 70 includes a cylindrical pin 69 that fits through two opposed and aligned openings in respective flanges 34a, 34b of the second mating member 76 and through a mating flange (not visible in view shown in Fig. 4C) with an opening in the first mating member 75 that fits between flanges 34a and 34b.

First mating member 75 defines a pair of first holes 77. Second mating member 76 defines a pair of second holes 78. Each of the second holes 78 of the second mating member 76 is threaded to receive a threaded screw 79. Each of the first holes 77 of the first mating member 76 is countersunk to receive the head of the corresponding threaded screw 79 so that the head would be flush with the surface of the first mating member 75 when screwed into the second hole 78 of the second mating member 76. Each of the first holes 77 of the first mating member 75 is configured to be aligned with a respective second hole 78 of the second mating member 76 when the riser clamp 70 grips the riser 12 and the stand-off 61. A threaded screw 79 is inserted through each of the first holes 77 of the first mating member 75 and screwed into the corresponding aligned second hole 78 of the second mating member 76. Upon tightening of the two threaded screws 79, the riser clamp 60 is configured to selectively grip the riser 12 and the stand-off 61.

As shown in Fig. 5 for example, one end 52 of the first flexible steel conduit 48 is connected to one of the supply lines 16 for the hot water. The opposite end 50 of the first flexible steel conduit 48 is connected to the universal tap 42. The wall bracket 63 of the riser support is connected at one end of the stand-off 61 to the wall 66 behind the sink 67. The opposite end of the stand-off 61 is connected to the riser clamp 70, which is also connected to the riser 12.

In accordance with a further aspect of the present invention, a method of preparing a faucet with pre-rinse assembly for shipping is provided. As shown in Fig. 6 for example, a packing insert 80 includes a planar, rigid substrate 32 that is used to form a rigid and sturdy platform on which fittings of the faucet with the pre-rinse assembly can be mounted and attached for shipping. A suitable packing insert 80 is composed of corrugated paperboard. Such corrugated paperboard typically is rendered porous to the passage of air through the substrate 32 by being provided with a plurality of tiny holes (not shown) disposed uniformly over the entire area of the substrate. Such cardboard sheeting is commercially available in various thicknesses and can be cut to the desired length and width, scored and folded for purposes of serving as the packing insert 80 for shipping the faucet and pre-rinse assembly. A three-eighths inch thickness of 200 pound test corrugated cardboard that is coated on one side for skin packing adequately serves as the material for the packing insert 80.

According to one aspect of the invention, certain of the fittings are pre-assembled and packed in their pre-assembled form in order to reduce the time needed for the installer to connect these parts prior to installation once they are removed from the shipping packages. In accordance with the present invention, plumbing fixtures for

commercial sinks with a pre-rinse unit are supplied in a package that protects the fittings from nicks and scratches while reducing the effort required of the installer to unpack the fittings and install them with less effort and time than conventionally packed fittings. Two examples of this aspect of the invention are schematically illustrated in Figs. 7A and 7B for example. Each of Figs. 7A and 7B discloses a packing insert 80 for such a package as the outer carton 10 shown in Fig. 1 for example.

Accordingly, as shown schematically in Fig. 6, a connection fitting 81 can be screwed onto one end of the flexible steel hose 13 that comprises a fitting of the pre-rinse assembly. This flexible steel hose 13 also can be provided with a water impermeable sleeve (not shown) that fits inside steel hose 13 and lines the length of the flexible steel hose 13. The water impermeable sleeve can be formed of any of a number of plastic and/or rubber materials as is conventional in the art. The combination of the flexible steel hose 13 with the inserted plastic sleeve can be preinstalled through the tension spring 82 that surrounds part of the hose 13 until the connection fitting 81 is held by one end of the tension spring 82 as shown in Fig. 6. In this form shown in Fig. 6 for example, the connection fitting 81 is ready to be screwed into the end of the riser 12 that is opposite the end of the riser 12 that is connected to the faucet 41. The desired details of the riser assembly and in particular the connection of the riser 12 to the faucet 41 are disclosed in commonly owned U.S. Application Serial No. 10/464,007, filed June 18, 2003, which is hereby incorporated herein for all purposes.

As shown schematically in Fig. 6 for example, the tension spring 82 that surrounds the pre-installed flexible steel hose 13, which is attached to the connection fitting 81 and contains the water impermeable sleeve, is placed onto the substrate 32.

A shell 83 that is rigid and desirably formed of transparent plastic material is configured and disposed to cover the spring 82 and the hose 13 inserted therein. This shell 83 is pre-molded to the desired configuration that enables the shell 83 to be placed over the spring 82 and hose 13 and rest against the substrate 32. The shell 83 is desirably composed of clear polyvinylchloride having a basis weight of about 0.105 kilograms per cubic meter.

As schematically shown in Fig. 6 for example, a sheet 84 of flexible material is configured to cover the substrate 32. The sheet 84 of flexible material desirably comprises a film composed of a polyethylene ionomer resin having a basis weight in the range of about 920 kilograms per cubic meter to about 950 kilograms per cubic meter. The sheet 84 of flexible material is heated to a temperature in the range of about 70 degrees Centigrade to about 110 degrees Centigrade. After heating and while still at temperature, the sheet 84 is draped on top of the shell 83 and the substrate 32 on which the shell 83 that shields the tension spring 82 and attached fittings have been placed. Then a vacuum is applied from beneath the substrate 32 through the holes in the substrate to draw the heated sheet 84 onto the substrate 32 and shrink wrap the sheet 84 over the shell 83 and the substrate 32.

In this manner, as shown schematically in Fig. 7A, the shrink-wrapped sheet 84 of flexible material is attached to the shell 83 and the substrate 32 and holds the shell 83 against the substrate 32, trapping the tension spring 82, steel hose 13, connection fitting 81 and plastic sleeve (not shown) between the shell 83 and the substrate 33. In this way, the fittings beneath the shell 83 are sandwiched between the shell 83 and the substrate 32 and thus are prevented from movement during shipping of the package.

This sub-assembly is ready for attachment of the connection fitting 81 to the riser 12 upon removal of the shell 83 and its adhered shrink wrapped sheet 84. Depending upon the particular fittings that are desired to be included on a single substrate, the end result can resemble one of the packing assemblies 85, 86 shown in Figs. 7A and 7B respectively, for example.

Referring to Fig. 8A, the disengagement of the fittings of the pre-rinse assembly from the substrate 32 of the shipping insert 80 is schematically represented. As indicated by the arrow designated 88 in Fig. 8A, the installer can use the blade of a box cutter 89 to cut around the sheet 84 of flexible material along the border of the shell 83 that encloses the tension spring 82 and associated pre-installed fittings. As schematically represented in Fig. 8B by the arrows designated 90 for example, with essentially a single cut around the edge of the shell 83, the shell can be peeled back together with the shrink-wrapped flexible material 84 that covered and adhered to the shell 83. Thus, peeling back the shell 83 frees the underlying tension spring 82 and associated assembled fittings from the packing insert 80 and shrink-wrapped material 84. This method of packing the pre-assembled fittings eliminates the need for the installer to scrape off the shrink-wrapped flexible material 84 from any of the fittings of the pre-rinse assembly. Moreover, the pre-assembly of these fittings frees up additional time of the installer that otherwise would have been needed to assemble the fittings once they were removed from the shipping package.

While at least one presently preferred embodiment of the invention has been described using specific terms, such description is for illustrative purposes only, and it is to be understood that changes and variations may be made without departing from the

spirit or scope of the following claims.